

REMARKS/ARGUMENTS

Explanation of Amendments

The amendments to claims 14 and 15 merely change their dependency to correspond to the renumbered claims. The amendments were necessitated because of the change in claim numbering from 10-14 to 11-15. The amendments raise no new issues that would require further search and/or consideration. Accordingly, it is respectfully requested that they be entered for purposes of allowance or, if necessary, appeal.

Claim Numbering

The Examiner is thanked for correcting the claim numbering. In their previous response Applicant overlooked the fact there was a claim 10 in the original application that was cancelled by preliminary amendment.

Claim Objection

The objection to claim 1 because of lack of antecedent basis for “the front” of the tube sheet is not understood. Actually, the claim reads “the front” of said tube sheet. Clearly, there is antecedent basis for the term “said tube sheet.” Thus, it is considered appropriate to refer to “the front” of said tube sheet”, since “said tube sheet” has only one front that is cooled by the mixture of fresh and extracted cooling liquid. Accordingly, it is respectfully requested the objection be withdrawn. If the rejection is maintained, further information is requested on the specific basis for the objection and/or how the objection can be overcome.

Rejection of Claims 1-7 Based on Richter et al in View of Brucher

The rejection of claims 1-7 under 35 U.S.C. § 103(a) as being unpatentable over Richter et al (US 3,915,224) in view of Brucher (US 6,148,908) is respectfully traversed.

An important feature of the Applicant’s process and apparatus is that the upstream tubular part be sealingly connected to a tube sheet, and that both of these (i.e., the upstream tubular part and the tube sheet) be positioned in the horizontal duct between the partial oxidation reactor and the heat exchange vessel. The requirement that upstream tubular part and the tube sheet be positioned in the horizontal duct are specifically recited in independent claims 1 and 6, and through dependency is included in all of the remaining claims.

A careful reading of Richter et al reveals that the apparatus and process therein disclosed does not have an upstream tubular part and tube sheet positioned in the horizontal

duct. Item 2 in the figure in Richter et al is clearly stated to be a “bricklined inlet housing” (col. 3, line 52). The inlet housing is located directly beneath the process gas cooler 1 and has a vertical orientation. As one skilled in the art would know, the only part of the apparatus in Richter et al that could reasonably be construed to be a “horizontal duct” is the unnumbered horizontal line leading into inlet housing 2 from the left side in the drawing. It is through this horizontal line that the hot process gas (represented by the arrow) passes into inlet housing 2 and from inlet housing 2 into the process gas cooler vessel through tubes 3.

It is also noted, that the ends of tubes 3 are flush or even with (i.e., in the same plane) as the bottom wall of the cooler. Thus, the ends of tubes 3 do not actually extend into inlet housing 2 as stated in the Office action, and they certainly do not extend into the horizontal line used to pass hot process gas into the inlet housing 2. There is absolutely no contemplation in either Richter et al or Brucher of positioning an upstream tubular part and a tube sheet to which it is sealingly connected, in the horizontal duct that connects a partial oxidation reactor to a heat exchanger. Therefore, since each of claims 1-9 and 11-15, contain this limitation, either directly or through dependency, these claims are patentable over Richter et al in view of Brucher.

Rejection of Claims 8-9 & 11-15 Based on Richter et al in View of Brucher and Schuurman

The rejection of claims 8, 9 and 11-15 under 35 U.S.C. § 103(a) as being unpatentable over Richter et al (US 3,915,224) in view of Brucher (US 6,148,908) and further in view of Schuurman (US 4,029,054), is respectfully traversed.

As discussed above, the ends of tube 3 in Richter et al are flush or even with the bottom wall of process gas cooler 1 and thus do not extend into inlet housing 2, and certainly do not extend into, and are not positioned, in a horizontal duct. As also discussed above, the only part of the apparatus in Richter et al that could reasonably be construed to be a horizontal duct is the unnumbered horizontal line through which hot process gas pass into inlet housing 2. There is no upstream tubular part or tube sheet positioned in this horizontal line.

In addition, to failing to meet the limitation that an upstream tubular part be positioned in a horizontal duct between a partial oxidation reactor and a heat exchange vessel, Richter et al does not disclose means to supply part of fresh cooling medium to an elevated position in the heat exchange vessel. This is recognized in the subject Office action. However, it is contended that this feature of the present invention would be obvious from the disclosure in Schuurman which teaches supplying coolant through supply line 9 which enters the waste heat boiler near the top of the vessel.

Applicant pointed in their previous response that while supply line 9 itself enters the waste heat boiler of Schuurman near the top of the vessel, the coolant passing through supply line 9 is supplied to the lower end of concentric inner tube 18 at or near the bottom of the vessel (column 8, lines 23-26). Therefore, Schuurman does not suggest supplying coolant to an elevated position in heat exchange vessel.

In the subject Office action it is stated that Applicant's argument was unpersuasive because the phrase "an elevated position" reads on any position above the bottom surface. Since the rejection is based on obviousness, Applicant respectfully submits the issue is not whether "elevated position reads on any position above the bottom surface. Rather, the issue is whether it would be obvious from Schuurman's disclosure of supplying coolant through supply line 9 to lower end of inner tube 18 at or near the bottom of the vessel, to supply fresh coolant to an elevated position in the heat exchange vessel as Applicant has done in order to establish natural circulation of the cooling medium. Applicant respectfully submits it would not be obvious for the reasons discussed below.

In determining whether it would be obvious to supply fresh coolant to an elevated position in the heat exchange vessel, it is important to consider the purpose for which the coolant is added. As explained on page 9 of the specification, lines 12-32, and recited in claim 13, the purpose of supplying the relatively cold cooling medium to an elevated position in said vessel to establish a natural circulation of the cooling medium in the vertical part of the cooler. Natural circulation is established because the fresh cooling medium has a higher density and therefore flows downward through downcomers in the vessel, while the water-steam mixture rises in helix tubes 4. This concept of natural circulation is not disclosed in Schuurman, and would not occur inherently in the waste heat boiler of Schuurman, since the fresh, higher density coolant is supplied directly via supply line 9 to a lower portion of the vessel (where it would stay because of its higher density, until heated or turned into steam).

It is noted that supplying fresh coolant to the lower part of the vessel as taught by Schuurman is logical in that this is where the higher temperatures occur because of the proximity to entry of hot gases into the lower portion of the vessel through helical cooling pipes 13. Applicant, in supplying the fresh cooling medium to an elevated position in the vessel to promote natural circulation represents a distinct and non-obvious departure from the teachings of Schuurman that coolant should be supplied the lower end of concentric inner tube 18, which is situated in the bottom of the heat exchange vessel.

Therefore, Schuurman, alone or in combination with Richter et al, does not teach or reasonably suggest the subject matter of claims 8, 13 or 14, all of which require supplying coolant to an elevated position in the heat exchange vessel which promotes natural circulation.

Claim 9 (and through dependency claim 11) requires that the cooling medium compartment be divided into a first and second compartment, the latter of which is positioned in the horizontal duct between the partial oxidation reactor and the heat exchange vessel. Neither Richter et al or Schuurman teach or suggest placing a compartment for receiving a mixture of fresh and extracted cooling medium in the horizontal duct. Claims 12 and 15 require cooling of the upstream tubular part which is located in the horizontal duct, as previously discussed.

For all the above reasons and in view of the amendments, claims 1-9, and 11-15, are believed to be patentable over the cited references.

Accordingly, reconsideration and favorable action of the application is respectfully requested.

Respectfully submitted,

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